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Social innovation, sustainability and the governance of protected areas: revealing theory as it plays out in practice in Costa Rica

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Protected areas (PAs) are social-ecological systems (SES) and are contested spaces. The challenges in governing PAs call for a governance system that works with human-nature relations and is capable of adapting to each PA. This necessitates innovative processes and adaptive governance. This paper contributes to the discussion on adaptive governance in SES by offering empirical evidence from Costa Rica on how the processes of social innovation occur in practice. We discuss the evolving governance of the Juan Castro Blanco National Water Park, particularly the contribution of a local association that drives conservation and management of the park. We show that social mobilisation caused social innovation, which was revealed by the achievement of three interconnected process outcomes: satisfaction of interests; effective socio-political arrangements; and empowerment. The socially-innovative governance of the park has contributed to sustainability and to social-ecological change at many levels.

Keywords: social innovation; social-ecological systems; social sustainability; protected area management; common-pool resources

1. Introduction

Costa Rica is well known for its conservation and environmental policies (Steinberg 2001). Its national protected area (PA) system, which includes public and private lands, covers almost 27% of its territory (Kohlmann *et al*. 2010). The PA system secures not only biodiversity, but also the natural resources used in green energy production, for example almost all volcanoes and aquifers are protected. However, this does not necessarily prevent disputes arising over the use of resources (Kuzdas *et al*. 2014). Costa Rica's role in biodiversity conservation is particularly important because, in its mere 52,100 square kilometres, it accounts for 4.5% of the world's biodiversity (Obando-Acuña 2007). Costa Rica's commitment to environmental management is demonstrated by the fact that 98% of its electricity comes from renewable sources, primarily hydro and geothermal (GOBIERNOCR 2017).

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The success of environmental management in Costa Rica is partly because of the activism of NGOs and their participation in the management of PAs (Miller 2006). These socio-political arrangements have been little studied, except for the conservation areas of Arenal-Tempisque (Lober 1992), Guanacaste (Basurto and Jiménez-Pérez 2013; Pringle 2017) and La Amistad-Caribe (Kitamura and Clapp 2013; Molina-Murillo, Pérez Castillo, and Herrera Ugalde 2014).

PAs are typically contested spaces (Borrini-Feyerabend and Hill 2015; Dudley *et al*. 2014; Brockington, Duffy, and Igoe 2008). There is ongoing debate about the reasons justifying the creation of PAs, revolving around whether PAs should be safeguarded for their intrinsic values or their instrumental values (Doak *et al*. 2014; Tallis and Lubchenco 2014). The discussion also considers the impacts of PAs on local communities (Vanclay 2017), as well as the effectiveness of the conservation strategy with or without local support (Berkes 2004; Birnbaum 2016; Hanna, Clark, and Slocombe 2008; Holmes 2013; Watson *et al*. 2014). At the core of these discussions are human–nature relations and their tensions, and recognition of the need for a governance system that works with social-ecological intertwinedness and is capable of adapting to the particular conditions of each PA (Borrini-Feyerabend and Hill 2015; Parra and Moulaert 2016). For Ostrom (2012), one of the challenges in achieving sustainability is to overcome the panacea problem, the idea that there is a universal solution to the tragedy of the commons. To overcome this problem demands that we understand how governance systems actually work in practice and how they can be re-designed to suit a diversity of social and ecological conditions.

We use a social innovation perspective to explore the governance system of the Juan-Castro-Blanco National Water Park in the middle of Costa Rica. We are interested in how social innovation influenced governance processes that led to social and ecological transformations (Mehmood and Parra 2013). We define social innovation as changes in social relations, political arrangements and/or governance processes that lead to improvement in a social system. Social innovation is underexplored in the PA literature, although Biggs, Westley, and Carpenter (2010) used the concept to provide a pilot assessment on the necessary transformations in ecosystem management.

Juan-Castro-Blanco came into being as a result of community interest and the support of local government. It provides water to approximately 150 communities and 10 hydropower projects, and plays an important role in the conservation of vulnerable endemic biodiversity, for example the frog *Lithobates vibicarius* and the trees, *Nectandra smithii* and *Oreomunnea pterocarpa* (SINAC 2012). The governance of the Juan-Castro-Blanco is a mix of public, private and community-based mechanisms that contribute to regional sustainable development by protecting forests, biodiversity and freshwater, while allowing various social entities to benefit from innovative arrangements. With our analysis of the Juan-Castro-Blanco National Water Park, we describe the governance of a social-ecological system (SES) that is more than just adaptive – it demonstrates proactivity, socially innovation, and transformative potential.

We draw on insights from three fields: PA governance (Borrini-Feyerabend and Hill 2015; Hanna, Clark, and Slocombe 2008; Hayes and Ostrom 2005; Mathevet *et al*. 2016); SES governance (Brondizio, Ostrom, and Young 2009; Liu *et al*. 2007; Schultz *et al*. 2015); and social innovation (Mehmood and Parra 2013; Moulaert, MacCallum, and Hillier 2013a; Parra 2013). Using a case study (i.e. the Juan-Castro-Blanco), we reveal how social innovation can encourage more proactive governance of protected areas, and we describe the process outcomes that arise from social

innovation, specifically the satisfaction of interests, changes to socio-political arrangements, and empowerment (Moulaert 2009). We present a synthesis of how these process outcomes were achieved in the governance of the Juan-Castro-Blanco. We discuss the relevance of social innovation for PA governance and conclude by highlighting how social innovation can be fostered to improve sustainable regional development and social-ecological change.

2. The governance of protected areas, social-ecological systems and social innovation

2.1. The governance of protected areas

A PA is "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley 2008, 60). The way a PA comes into being and how its status is enforced influences how effective it is as a conservation strategy (Hanna, Clark, and Slocombe 2008). In terms of purpose, level of protection, and land ownership, the types of PA vary from country to country and have been changing over time (Dudley *et al*. 2014). Although once having a very strict protectionist philosophy, the International Union for Conservation of Nature (IUCN) now allows a degree of resource use by local communities and other actors (Dudley *et al*. 2010; Francis 2008). Nevertheless, transformation in the governance of PAs is still a challenge (Mathevet *et al*. 2016; Moore and Tjornbo 2012; Pringle 2017). Finding better ways of governing biodiversity and natural resources occupies the science and practice of PA management.

Typically, in the past, although less so in the present, the governance of PAs was top-down, with a public institution in charge, sometimes inviting NGOs representing local communities to participate (Borrini-Feyerabend and Hill 2015). When this typical governance structure is challenged by uncommon problems or unconventional arrangements, opportunities for transformation arise (see Borrini-Feyerabend *et al*. 2013). The scholarship on PA governance recognises that local institutions play a significant role in the success of a PA (Berkes 2004; Hanna, Clark, and Slocombe 2008; Hayes and Ostrom 2005; Kelboro and Stellmacher 2015; Mathevet *et al*. 2016). Irrespective of whether a PA is created for its intrinsic or instrumental value, its governance must consider – and be a part of – the social and political arrangements of the communities and organisations affected by the PA (Vanclay 2017). Therefore, a PA will only be successful when its governance is adaptive, responding to the particularities of its social-ecological context, and when it delivers lasting sustainable results for the benefit of local communities and society in general (Borrini-Feyerabend *et al*. 2013; Ostrom 2012).

2.2. Protected areas as social ecological systems

One way to look at PAs is through the perspective of SES, which denotes how relations between society and nature, and their processes and dynamics, are intertwined (Berkes 2004; Cumming and Allen 2017; Liu *et al*. 2007; Parra and Moulaert 2016). PAs are a social creation established for the benefit of current and future generations and seek to protect nature from the pressures of contemporary society. SES is a valuable approach to apply to the analysis of PAs because decisions taken about how to

manage biodiversity and natural resources will impact on societal development and, conversely, decisions made for societal development will directly and indirectly affect PAs (Cumming and Allen 2017; Parra and Moulaert 2016).

Scholars highlight that the governance of SES (and PAs) must be adaptive (Borrini-Feyerabend and Hill 2015; Brondizio, Ostrom, and Young 2009; Francis 2008; Schultz *et al*. 2015). Adaptive governance means more than just being flexible, coping with change, or seeking to build resilience (Armitage, Berkes, and Doubleday 2007; Folke *et al.* 2005; Imperiale and Vanclay 2016), it also requires that the socio-political arrangements governing an SES: (1) actively enable the involvement of different actors (State, local organisations and communities in general); (2) embrace diversity of values, interests, perspectives, and methods of management; and (3) are able to effectively reconcile conflict among actors (drawing on Dietz, Ostrom, and Stern 2003).

Adaptive governance is inclusive, horizontal and sensitive to the context of the SES, and facilitates collaboration between actors as a way of gathering knowledge from practice (Birnbaum 2016; Bodin, Sandström, and Crona 2017). Adaptive governance is expected to help the SES adapt to change and to traverse thresholds (Armitage, Berkes, and Doubleday 2007), not by bouncing back but by bouncing forward (Davoudi *et al*. 2012; Imperiale and Vanclay 2016).

2.3. Social innovation for the governance of social-ecological systems

Social innovation is frequently featured in government policy (ANSPE 2018; Australian Government 2011; BEPA 2014; OECD 2011; Presidencia de la República de Colombia 2014; White House 2015) and academic research (Ayob, Teasdale, and Fagan 2016; Baker and Mehmood 2015; MacCallum *et al*. 2009; Mehmood and Parra 2013; Murray, Caulier-Grice, and Mulgan 2010; Nicholls and Murdock 2012; Parra 2013) as a way to foster entrepreneurship, socioeconomic enhancement and sustainable development.

Drawing on Moulaert *et al*.'s (2013b) understanding of the concept, we define social innovation as changes in social relations, political arrangements and/or governance processes that lead to improvement in a social system. Social innovation is meant to improve society; therefore, it is normative in concept and practice (Jessop *et al.* 2013). Social innovation refers "not just to particular actions, but also to the mobilisation-participation processes and to the outcome[s] of actions which lead to improvements in social relations, structures of governance, greater collective empowerment, and so on" (Moulaert *et al*. 2013b, 2). Social innovation improves the system's connections between socio-political levels and spatial scales. In particular, social innovation has the potential to link bottom-up initiatives with those at higher spatial levels, leading to bottom-linked systems of governance, which can result in inclusive, diverse and adaptive governance systems (Pradel Miquel, García Cabeza, and Eizaguirre Anglada 2013; Spijker and Parra 2018).

Social innovation is important in the adaptive governance of SES, and for biodiversity and natural resource conservation (Chapin *et al*. 2010; Westley *et al*. 2013; Young *et al*. 2006) but has been little studied in this context. Social innovation responds to the particular needs of the territory where it emerges, reflects the choices and decisions of the actors involved and seeks to improve the social and ecological conditions of the territory (Mehmood and Parra 2013; Moulaert 2009; Van Dyck and Van den Broeck

2013). Social innovation improves the ability of a SES to respond to change and new challenges by identifying the factors and leverage points that foster transformation (Biggs, Westley, and Carpenter 2010). It promotes proactive and sustainable governance of a system, because it develops from the needs, challenges, resources and institutions of that SES. "People raise and frame socio-ecological problems, produce knowledge to deal with them and become socially engaged to address problems" (Parra 2013, 150). Over time, social innovation leads not only to a modification in the issues that are addressed, but also to changes in the problems themselves, and in the ways these challenges are addressed; including transformation in the structures and systems of governance. Social innovation is iterative in that it, itself, reveals opportunities to adapt to change and it inspires and initiates change.

2.4. Process outcomes from social innovation

Moulaert *et al*. (2005) described social innovation as a transformative process of social change. In the context of an SES, transformation means significant improvement in the system, its governance, or in the substantive or process outcomes achieved. Transformation requires and leads to profound changes in the knowledge, attitudes, skills, aspirations or behaviour of the actors (including their beliefs, norms, policies and practices), and in the flow, allocation and quality of power and resources in the SES (Baker and Mehmood 2015; Moore and Tjornbo 2012). In this process of transformation, it is possible to identify three interrelated process outcomes that tend to occur (and that we discuss below): satisfaction of the interests of actors; changes in socio-political arrangements; and empowerment of the participating actors (Moulaert *et al*. 2005; Moulaert, MacCallum, and Hillier 2013a).

The first process outcome that tends to occur from social innovation is the satisfaction of the needs, desires and aspirations (i.e. the interests) of key actors, including the environment itself. Social innovation provides new ways by which interests at multiple levels can be identified, assessed and addressed. Innovation in methods and processes enhance the effectiveness and efficiency of decision-making processes, which means that the interests of more people can be considered and potentially met. Social innovation is an iterative process resulting in the revision and refinement of the interests of all parties, creating greater alignment and the ability to simultaneously meet the interests of the various actors (Parra 2013).

The second process outcome relates to changes in socio-political arrangements. Social innovation can occur in terms of the forms of social networks and the social relations between the people in the networks (Moulaert, MacCallum, and Hillier 2013a). This social innovation might include ensuring the effective engagement of all key actors by the adoption of an improved governance mechanism that is more horizontal, participatory and inclusive – i.e. an adaptive governance system (Armitage, Berkes, and Doubleday 2007; Dietz, Ostrom, and Stern 2003; Folke *et al*. 2005).

The third process outcome is empowerment of the participating actors. Empowerment is enhanced when changes in agendas and visions, and in the actions of relevant actors and institutions, lead to better inclusion of all social groups in decision-making, implementation and monitoring of strategies (Moulaert, MacCallum, and Hillier 2013a). This can lead to the utilisation and diffusion of alternative knowledge (e.g. of those not previously included) and to better management of the SES (Birnbaum 2016; Parra 2013).

3. Methodology

To see how social innovation played out in practice, we considered the evolution of the Juan-Castro-Blanco National Water Park in Costa Rica, which is under the jurisdiction of the Arenal-Huetar North Conservation Area (ACAHN) within the Ministry of Environment and Energy. We specifically analysed how social innovation was expressed in the governance of the park. We primarily studied APANAJUCA (the Association for the Protection of the Juan-Castro-Blanco National Water Park), a self-organised, bottom-up, volunteer initiative that emerged to protect the park's freshwater and other natural resources. We observed the regional networks that developed around APANAJUCA to help us understand the dynamic ways in which the relations between the social and ecological are negotiated, maintained and fostered. It was not the intention of this paper to describe the observed dynamics; rather our purpose was to exemplify how social innovation plays out in practice and to discuss how this can enhance PA governance and regional sustainability.

The research was conducted as qualitative case study undertaken between 2013 and 2016. A total of seven months was spent by the lead author in Costa Rica. As a case study, a variety of research methods were used. First, 37 in-depth, semistructured interviews were conducted in Spanish, including with key representatives of APANAJUCA, the Costa Rican Ministry of Environment and Energy, the Municipality of San Carlos, the Inter-American Development Bank, the University of Costa Rica, the National Technical University, actors from the communities around the Juan-Castro-Blanco, private entrepreneurs, and representatives of cooperatives and other NGOs. Formal informed consent was obtained for all interviews, and other principles of social research ethics were observed (Vanclay, Baines, and Taylor 2013). Second, attendance (and observation) by special invitation at a range of meetings including: (i) between ACAHN and the Vice Minister of Environment, (ii) the Rural Electrification Cooperative of San Carlos (COOPELESCA), (iii) the Board of APANAJUCA, and (iv) a national water congress, which was attended by all key actors. Third, the lead author spent several days visiting the park, surrounds and nearby local communities. For these activities, she was accompanied by various actors associated with the PA (e.g. APANAJUCA board members, university student groups, and members of NGOs). Observations were recorded in a diary. Finally, we conducted a document analysis of all relevant archival, legal and online resources relating to the Juan-Castro-Blanco.

We utilised grounded theory tools, triangulation and a reflexive approach in our data gathering and analysis. Before going out into the field, we reviewed all available information on the case. We used these initial findings to establish general guidelines for the interviews, but allowed participants to express what they considered to be important in the evolution of the park's governance. The interviews were audio-recorded and extensive notes were taken (on an iPad) during all interviews. The notes were then coded using Atlas.Ti. Initial coding utilised an emergent coding process, with the topics mentioned by the interviewees, which were later coded into broader themes associated with the theoretical framework of this paper.

We disclose that the primary author is a Costa Rican citizen who had previously worked as a planner in the Huetar-North region. Her professional and social contacts enabled her to have access to many sources that may not have been available to other researchers. However, at the time of the research, she had no relationship that would have constituted a conflict of interest.

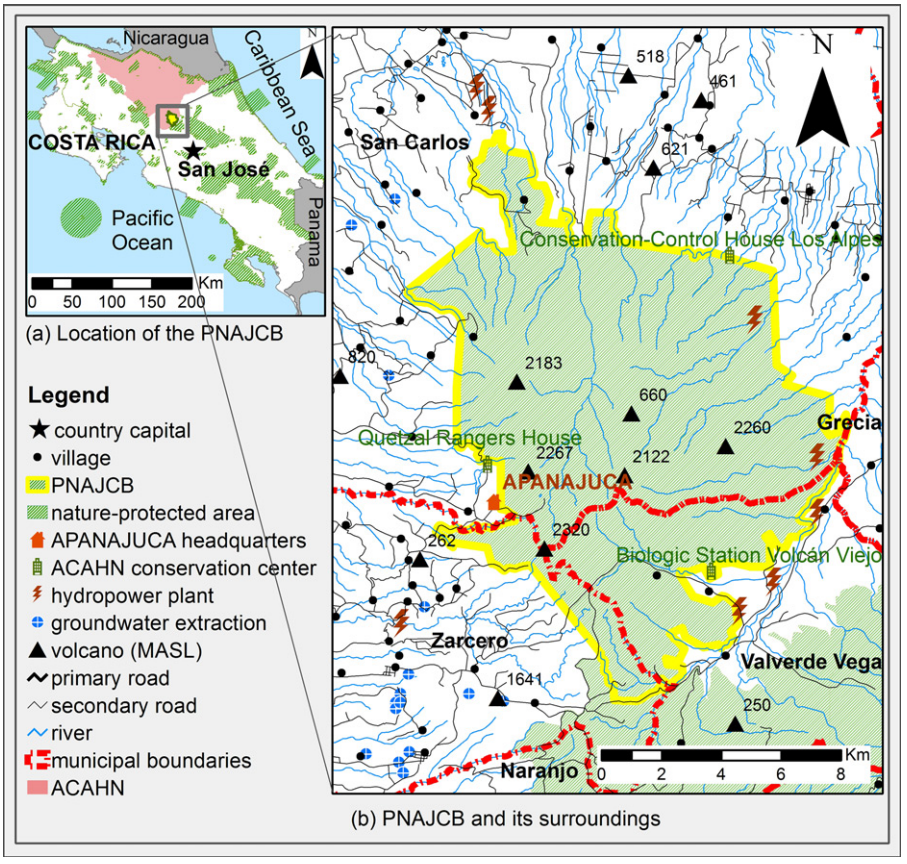

Figure 1. Map of the Juan-Castro-Blanco National Water Park.
Source: author based on geographical information data provided by the Municipality of San Carlos, 2015; supplemented by personal observations.

4. The Juan-Castro-Blanco National Water Park and its champions

Juan-Castro-Blanco is a PA in the middle of Costa Rica founded in 1968. Although expanding over time, since 1975 it has been around 14,000 hectares. It is significant because of its substantial water resources and biodiversity. The park ranges in altitude from 490 m to 2330 m (Figure 1), with steep slopes covering over 95% of its area. Landcover comprises primary forest (70%), farmland, and former mining sites that are being regenerated. The protective status of the park has been increasing over time due to the activities of various social groups, primarily with the intention to protect its water resources (Table 1).

The social-ecological movement behind the creation of the park was one of the first community-based environmental mobilisations in Costa Rica. The leaders were local people, including active members of the Catholic Church, politicians, teachers, retailers, tourism entrepreneurs, representatives of communal associations, and individuals working at the electric companies, banks, municipalities and other public institutions. These individuals first came together as a local committee under the auspices of the Municipality of San Carlos, which had a strong interest in the park. In 1989, the Costa Rican central government granted a concession to a Canadian mining company

Table 1. Evolution of the Juan-Castro-Blanco National Water Park.

Year	Name and national protective category	IUCN protective category	Area (Ha)	Key responsible actors	Motive
1968	National Forest Cerro Platanar	VI	2,500	Citizen committee and Municipality of San Carlos	Protect water, landscape and local recreational values
1975	Forestry Reserve Juan Castro Blanco	VI	13,700	Citizen committee and Municipality of San Carlos	Protect water and forest
1989	Protective Zone	VI	14,258	EZONO	Prevent deforestation
1992	National Park	II	14,258	EZONO, other local NGO's, Catholic Church and communities	Prevent mining exploitation
1993	National Park	II	14,458	EZONO and Ministry of Environment	Protect biodiversity and water
2003	National Water Park	II	14,458	APANAJUCA	Protect water and maintain ecological services

Source: author based on national laws, decrees, CENAP (1990), data provided by APAJAJUCA and supplemented by interviewees.

to mine sulphur in the park. There was a rapid backlash from the community who strategically decided to separate the committee from the municipality so that they would have more freedom to fight this action. The NGO, EZONO, was thus created and, within a year, was successful in getting the sulphur concession cancelled. EZONO also achieved increased protection status for the PA, and promoted a sense of solidarity and common purpose in the region (CENAP 1990).

Although EZONO continues to exist today, it primarily acts as an environmental activist group at the regional level. With EZONO going on to address other priorities in the wider region, in 1998 the Association for the Protection of the Juan-Castro-Blanco National Water Park (APANAJUCA) was created to protect the park. Its founders decided that the park needed a dedicated organisation that not only safeguards but represents the interests of the park, proactively working towards regional sustainable development. In 2003, APANAJUCA pushed the Costa Rican government to recognise the importance of the water resources, gaining for Juan-Castro-Blanco the unique protection category of national water park.

APANAJUCA was constituted to protect the Juan-Castro-Blanco: to be vigilant of, not only the use of its resources by the population, but also of government actions and public policies that might harm the park. Its aim was to support the consolidation, management, protection, surveillance and development of the Juan-Castro-Blanco,

ensuring freshwater as a "source of life for future generations". The actions and tools developed by APANAJUCA responded to the particular needs, challenges and resources of the territory, that is the conditions and capacities of the PA, its communities, actors, and institutions.

The ecological and social dynamics in the Juan-Castro-Blanco are intertwined. Through the actions of APANJUACA and its predecessors, the park's ecological qualities have been enhanced. In 1981, some university reports predicted that, if measures were not immediately taken, the forest cover would largely disappear by 2015, primarily from clearing for the expansion of dairy farming and agriculture (Bonilla 1981). Since then, clearing has been stopped; the amount of land protected has increased; theft of protected species (especially orchids and birds) has been reduced; habitats for endangered species have been enhanced, and there is increased community support for the park. At the time of writing (2018), the protected area of Juan-Castro Blanco was now over 14,000 hectares. Biodiversity recovery is taking place, for example the Heredia Robber frog, *Craugastor escoces,* has reappeared after being believed extinct for 30 years (Jiménez and Alvarado 2017).

In addition to its enhanced biodiversity status, the park is an important provider of ecosystem services and remains a major contributor to economic activity. It is the second largest water catchment in Costa Rica (in terms of harvest capacity), producing an average of 996 million cubic meters of water annually (SINAC 2012). More than 50 rivers have their source in the park, including many of the tributaries of the San Juan River of Nicaragua (SINAC 2012). The park provides potable water and irrigation to 150 communities in four municipalities comprising around 100,000 people (Blanco Rojas 2010). Water from the park is also used for hydroelectricity, generating over 160 MW or 17% of national electricity generation (SINAC 2012). Fourteen local and national public and private electricity companies derive direct benefit from the Juan-Castro-Blanco. Agriculture and dairying are also important activities within the park. The national cooperative of milk farmers, Dos Pinos R.L., with a large dairy processing plant in Quesada City, extracts its water from a spring that is fed by aquifers originating in the park. Some 216 cooperative members operate farms within the Juan-Castro-Blanco, their milk production comprises 12% of the national total.

In the Costa Rican context, the actions and achievements of APANAJUCA were unprecedented. APANAJUCA was recognised in 2012 with a national public award for 'Enhancement of the Quality of Life', because of its influence on regulations and formal conservation practices (Vida-UCR 2012). Costa Rica, like all developing countries, has insufficient economic resources to accomplish all national objectives. Although there is strong commitment for nature conservation and sustainable development, environmental management does not receive adequate financial support (Alpízar 2006; PEN 2013). Therefore, one mechanism that has been developed to address this deficiency is the implementation of controls over privately-held land. The Juan-Castro-Blanco is one such example, with 92% of its area being privately owned. In 1992, the government of Costa Rica intended to expropriate all private land within the park when it would have the financial resources to pay the compensation. In the interim, the current owners could continue to live in their existing dwellings, to utilise the land for current production activities, and even to sell the land, but they were restricted in their ability to change land use. Owners were not permitted to reduce forest coverage, and had an obligation to preserve biodiversity (Asamblea Legislativa 1998). At the time of writing, the government had not acquired any of the privately owned land.

5. How social innovation occurs in practice

By referring to our case study of the Juan-Castro-Blanco National Water Park, we exemplify how social innovation occurs in practice. We do this by describing in the context of our case the three process outcomes that arise from social innovation, specifically: the satisfaction of interests; changes to socio-political arrangements; and empowerment. The information presented here is primarily drawn from the interviews conducted with key actors. The examples we describe are not necessarily innovative in terms of being first in the world to use a particular tool or organisational strategy, rather they are examples of **social** innovation, especially in terms of how an otherwise conventional tool came to be used in the Costa Rican context, and the consequences of that use.

5.1. Satisfaction of the interests of key actors

APANAJUCA has high level goals relating to increasing the availability and quality of water for multiple purposes, and protection of the biodiversity values of the PA. It seeks to achieve this by consolidation of land in order to ensure contiguous forest cover. Using a range of socially-innovative actions and drawing on the effective social relations it had developed with the key actors, APANAJUCA was able to implement a process of land consolidation. Below, we describe four of their actions.

Placement of boundary markers. The Juan-Castro-Blanco was the first PA in Costa Rica to have its perimeter (81 km) demarcated by georeferenced markers, some 275 in total. This project was conducted between 2005 and 2006 with the participation of several parties, including hydroelectric companies, the Costa Rican Electricity Institute, ACAHN, and the Catholic Church. Due to the volunteer labour and equipment provided, the project only cost approximately $40,000, which was donated by the actors mentioned. By installing boundary markers the boundaries of the park were established definitely, which enables park management (ACAHN) to defend the park should there be any boundary disputes. The boundary markers also gave certainty and security to the extraction rights of the hydroelectric companies, so it was in their interests to participate in this action. The Church saw this as a way of being relevant to local communities and as a needed social action.

Legal action to recover public land. In 1999, with a dedicated fund for the acquisition of land being available, the Ministry started to acquire a key property of 7,733 ha (representing 53% of the park). At face value, this seemed like a good idea, however, APANAJUCA did something very unusual – through the actions of a volunteer lawyer, Douglas Murillo, they succeeded in stopping the purchase. After an 11-year legal process, they were able to establish in court that the land had been illegally privatised and was therefore technically public land anyway. On 26 February 2010, the court (*Tribunal Contencioso Administrativo, Sección IX*; File Number 02-00373-0163-CA) ruled that the land should be reclassified back to public land. With this action, APANAJUCA saved the $1.5 million fund, which could then be used for other purposes. For various bureaucratic complexities, however, at the time of writing, formal title of the land had still not been changed. Douglas Murillo had a personal connection to the park and a special interest in environmental law and civil cases. This action was a way of using his legal skills for the public good.

Establishment of a PA cadaster. Costa Rica lacks an official national cadastre, which causes problems for, and creates conflict between, various institutions. In 2008,

APANAJUCA together with ACAHN and the NGO, Nectandra Institute, initiated a project for the establishment and maintenance of a cadastre and property database for all land within the park. The project determined that there were 557 properties wholly or partly within the park boundaries. The Nectandra Institute designed a tool for capturing digital information, and trained public servants in its use. This tool can now be used for other protected areas. The tool is of immense value to APANAJUCA and its management (ACAHN). The Nectandra Institute is an environmental NGO committed to protecting cloud forest in Costa Rica.

Land acquisition. Given that the national government does not have sufficient means to buy the private property within the park, APANAJUCA designed a mechanism by which interested partner organisations can acquire land, which is then held in trust by the partner organisation for the collective good and conservation of the park. APANAJUCA finds interested organisations, manages the trust fund on behalf of the partner organisation, negotiates with landowners, and manages properties after they are bought. The first agreement under this mechanism was signed with COOPELESCA (the Rural Electrification Cooperative of San Carlos) in 2010. Since then, COOPELESCA's 60,000 members (electricity consumers) have been donating a small amount to the trust fund as part of their monthly electricity bill. By 2014, this had led to the acquisition of over 1,200 hectares, representing 8.5% of the park. This assisted in COOPELESCA gaining Carbon Neutral Certification in 2013.

5.2. Changes in socio-political arrangements

One of the benefits of APANAJUCA is its capacity to link top-down policy objectives with bottom-up community interests. In 2009, APANAJUCA was declared "a public utility in the interests of the State" (Gobierno de Costa Rica 2009) giving it the right to manage public funds and public property for the benefit of the State. With this endorsement, APANAJUCA became a legally-legitimate (as well as socially-legitimate) actor in the management of the PA, thus fostering a change in the park's governance from top-down to a more bottom-linked structure in which decision-making is shared.

The role APANJUCA has played in park governance was not only to integrate different sectors and actors, but also to set the agenda for the park's social-ecological development. For example, together with ACAHN, APANAJUCA has participated in the park's annual strategic planning process, setting priorities across the different tasks of: using the cadastre tool; managing tourism; promoting biodiversity conservation and research; enhancing ecosystem services; and conducting surveillance. The governance system has been enriched by the role that APANAJUCA plays. APANAJUCA links the relevant sectors and their interests with public institutions, and has the capacity to anticipate and manage conflicts, and bring in innovative ideas. In this adaptive and socially-innovative governance system, the public and private sectors, the community, and the PA itself can reveal and express their interests, and act collaboratively to enhance collective sustainability and well-being.

5.3. Empowerment of participating actors

Examining the social-ecological movements that led to the creation of the Juan-Castro-Blanco and APANAJUCA, it is clear that the different actors and sectors have been empowered. Acceptance of APANAJUCA as a legitimate management entity

facilitated a process that empowered various actors and strengthened their capacity in three ways. First, the initial self-organised community mobilisation that led to the creation of the park was able to evolve into a formal and stable organisation (i.e. APANAJUCA). Second, APANAJUCA became entrusted by the national government and other social actors with the management of the park and their collective concerns. Third, ACAHN and the Ministry gained the opportunity to become closer to civil society and take advantage of volunteer forces, developing sustainable co-management processes with the communities, farmers and hydroelectric companies within and on the periphery of the park.

The processes of social innovation enabled better identification, accessibility and management of the common-pool resources of the park. This developed gradually within the community, although some sectors required proof of how the various interests could be satisfied. A key opportunity came with the development of the COOPELESCA scheme. The unique aspect of this scheme was that APANAJUCA promotes land acquisition in the interests of the park, but does not become the land owner, thus retaining its trusted place as an 'honest broker'. The success of this scheme has led to further partnerships involving APANAJUCA, ACAHN, COOPELESCA and third parties. For example, an agreement was signed with the National Technical University in which its undergraduate students were encouraged to allocate their obligation to do 300 hours community service by assisting in various park activities (track maintenance, signage, and nursery labour).

6. Discussion

Our analysis of Juan-Castro-Blanco revealed how social innovation is locally produced and context specific in that social innovation is embedded in the local institutions and their interests and available resources (Moulaert 2009; Van Dyck and Van den Broeck 2013). Furthermore, while being moulded by the local physical and institutional conditions, social innovation improves an SES and its governance through the various ways in which people frame issues and act upon them (Parra 2013). In an iterative, dynamic process, opportunities for improvement are created (Borrini-Feyerabend and Hill 2015). For example, APANAJUCA aimed to act towards the protection of the park and its water resources, but they did more. In our case, social innovation led to substantive outcomes in ecological terms (e.g. land-use changes, improvement of ecosystems and ecosystem services, and increased quality and availability of water) and to process outcomes in social terms (e.g. satisfaction of interests, transformation in the governance system of the park, and empowerment of actors).

Nicholls and Murdock (2012) highlighted that social innovation can be invoked by processes that create: disruption or reconfiguration of the system; conflict and resistance; or inclusion and cooperation amongst actors. In the governance of the Juan-Castro-Blanco, resistance to top-down decisions, such as opposition to sulphur mining, initially characterised the actions of APANAJUCA and its predecessors. After winning some battles, APANAJUCA started to cooperate with ACAHN, the public agency responsible for the park's management. Later on, APANAJUCA adopted a more proactive role, in which they set the agenda and developed innovative mechanisms and processes for the management of the park. APANAJUCA achieved this, not by claiming ownership of the Juan-Castro-Blanco, but by being the legitimate voice of the interests of the park. In this way, APANAJUCA and ACAHN share responsibility for

communicating and decision-making. These nested political arrangements present challenges and opportunities for the management of PAs (Borrini-Feyerabend and Hill 2015), and show how significant local institutions can be in the success of PAs (Berkes 2004).

Social innovation, in the case of the Juan-Castro-Blanco and APANAJUCA, developed as dynamic social relations in response to social-ecological challenges prompting water protection as a common purpose. The improved social relations fostered transformations in the governance system towards an inclusive PA governance, in which access to decision-making processes and to the park itself facilitated satisfaction of the interests and empowerment of the participating actors. This kind of socially innovative governance system was adaptive and proactive, delivering benefits such as:

- innovation in the involvement and contribution of the community and private sector in PA management, leading to increased identification with the park and empowerment;
- innovation in engaging key individuals in significantly helping to achieve major conservation victories;
- innovation in the governance system by linking public and private organisations, and top-down with bottom-up structures, facilitating responsible access to common pool resources and enabling a broader vision that integrates social-ecological dynamics into the governance system of the PA;
- innovation in the rules, regulations, incentives, norms and legal arrangements relating to the park and its resources, not only opening opportunities to the private sector to contribute to conservation, but also in preventing actions that would jeopardise the sustainability of the resource; and
- innovation in identification, definition and satisfaction of the interests of participating actors, including the PA itself, the community, private sector, and public sector agencies.

The social innovation in the dynamics of the Juan-Castro-Blanco showed how bottom-linked processes of governance took place in the protection of natural resources and biodiversity. By pro-actively building and linking collective views about the future and identifying appropriate strategies, the practice of social innovation not only provoked social-ecological change but gave the opportunity to further enhance the outcomes. These views and strategies came from the collaboration of multiple actors, including the central and local governments, communities, public and private organisations, and individuals. The support of the State in promoting conditions for social innovation is desirable (Borrini-Feyerabend *et al*. 2013; Moulaert, MacCallum, and Hillier 2013a). In contexts like Costa Rica where financial resources are limited, the state could foster social innovation by implementing policies that facilitate private investment to support PAs, and by promoting proactive attitudes within public agencies, such as open-mindedness, flexibility, willingness to take risks, and trust in community engagement.

7. Conclusion

The Juan-Castro-Blanco National Water Park in Costa Rica was a good example of how social innovation was effected and led to better social-ecological outcomes.

APANAJUCA developed a range of actions which improved the ecosystem and provoked greater identification with the park and its resources by the local community and other actors. APANAJUCA's activities also led to changes in the governance system that empowered participating actors. Ultimately, APANAJUCA's actions resulted in a range of social, economic and environmental outcomes at local, national and arguably international scales.

Our definition of social innovation – changes in social relations, political arrangements and/or governance processes that lead to improvement in a social system – was effective and helped in understanding how society and nature, and their dynamics and processes, are intertwined; how social innovation contributes to improving a SES; how transformations in the governance of PAs take place; and in particular, how a local NGO achieved outcomes which enhanced the sustainability of a PA. In the identification and implementation of social innovation strategies and management actions, APANAJUCA was able to foster inclusive and adaptive processes of governance that would not have occurred otherwise.

Social innovation, as it played out in the Juan-Castro-Blanco, was manifested in three main process outcomes: the satisfaction of the interests (needs, desires and aspirations) of all key actors; changes in socio-political arrangements (which reciprocally enhanced these outcomes); and empowerment of participating actors. Social innovation helped in detecting and addressing problems and opportunities for more sustainable development, and generated new perceptions and behaviours provoking further changes in the SES. Social innovation is thus a process of social and spatial transformation.

By understanding a PA as an SES, it becomes clear that PA governance must consider the social and political arrangements of all relevant actors, especially the affected communities. Managing biodiversity and natural resources has an impact on societal development, and reciprocally, decisions about societal development influence the performance of PAs. In this sense, PA governance must not only adapt by coping with change, but needs to proactively enable the involvement of different actors, embrace diversity, and effectively reconcile conflict. As seen in our example, social innovation is important in adaptive governance processes because it improves the ability of an SES to respond to challenges by creating opportunities to enhance the system. Understanding how social innovation manifests in SES governance provides evidence-based support for strategies, actions and policies that contribute to the improved management of PAs and to regional sustainability. We believe our findings can be of relevance in discussions about practices of governance in nature conservation and provide a framework to assist in understanding the social-ecological dynamics and transformations taking place in PAs elsewhere.

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